Foodborne Illnesses (Bacterial)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Bacillus anthracis	2 days to weeks	Nausea, vomiting, malaise, bloody diarrhea, acute abdominal pain.	Weeks	Insufficiently cooked contaminated meat.	Blood	Penicillin is first choice for naturally acquired gastro-intestinal anthrax. Ciprofloxacin is second option.
Bacillus cereus (diarrheal toxin)	10-16 hrs	Abdominal cramps, watery diarrhea, nausea	24-48 hours	Meats, stews, gravies, vanilla sauce.	Testing not necessary, self-limiting (consider testing food and stool for toxin in outbreaks).	Supportive care, self-limiting
Bacillus cereus (preformed enterotoxin)	1-6 hrs	Sudden onset of severe nausea and vomiting. Diarrhea may be present.	24 hrs	Improperly refrigerated cooked and fried rice, meats.	Normally a clinical diagnosis. Clinical laboratories do not routinely identify this organism. If indicated, send stool and food specimens to reference laboratory for culture and toxin identification.	Supportive care.
Brucella abortus, B. melitensis, and B. suis	7-21 days	Fever, chills, sweating, weakness, headache, muscle and joint pain, diarrhea, bloody stools during acute phase.	Weeks	Raw milk, goat cheese made from un-pasteurized milk, contaminated meats.	Blood culture and positive serology.	Acute: Rifampin and doxycycline daily for $\geq$6 weeks. Infections with complications require combina-tion therapy with rifampin, tetra-cycline and an aminoglycoside.
Campylobacter jejuni	2-5 days	Diarrhea, cramps, fever, and vomiting; diarrhea may be bloody.	2-10 days	Raw and undercooked poultry, unpasteurized milk, contaminated water.	Routine stool culture; Campy-lobacter requires special media and incubation at 42^{o} to grow.	Supportive care. For severe cases, antibiotics such as erythromycin and quinolones may be indicated early in the diarrheal dis-ease. Guillain-Barre's syndrome can be a sequelae

(*Continued*) Foodborne Illnesses (Bacterial)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Clostridium botulinum children and adults (pre-formed toxins)	12-72 hrs	Vomiting, diarrhea, blurred vision, diplopia, dysphagia, and descending muscle weakness.	Variable (from days to months). Can be com-plicated by respiratory failure and death.	Home-canned foods with a low acid content, improperly canned commercial foods, Home-canned or fermented fish, herb-infused oils, baked potatoes in aluminum foil, cheese sauce, bottled garlic, foods held warm for extended periods of time (e.g. in a warm oven).	Stool, serum, and food can be tested for toxin. Stool and food can also be cultured for the organism. These tests can be performed at some State Health Department laboratories and the CDC.	Supportive care. Botulinum antitoxin is helpful if given early in the course of the illness. Call 404-639-2206 or 404-639-2888 weekends and evenings.
Clostridium botulinum infants	3-30 days	In infants <12 months, lethargy, weakness, poor feeding, constipation, hypotonia, poor head control, poor gag and suck	Variable	Honey, home-canned vegetables and fruits.	Stool, serum, and food can be tested for toxin. Stool and food can also be cultured for the organism. These tests can be performed at some State Health Department laboratories and the CDC.	Supportive care. Botulism immune globulin can be obtained from the Infant Botulism Prevention Program, Health and Human Services,California (501-540-2646). Botulinum anti-toxin is generally not recommended for infants.
Clostridium perfringens toxin	8-16 hrs	Watery diarrhea, nausea, abdominal cramps; fever is rare.	24-48 hrs	Meats, poultry, gravy, dried or precooked foods.	Stools can be tested for entero-toxin and cultured for organism. Because Clostridium per-fringens can normally be found in stool, quanti-tative cultures must be done.	Supportive care. Antibiotics not indicated.

(*Continued*) Foodborne Illnesses (Bacterial)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Enterohemorrhagic E. coli (EHEC) including E. coli 0157:H7 and other Shigatoxin producing E. coli (STEC)	1-8 days	Severe diarrhea that is often bloody, abdominal pain and vomiting. Usually, little or no fever is present. More common in children <4 years.	5-10 days	Undercooked beef, unpasteurized milk and juice, raw fruits and vegetables (e.g. sprouts), salami, salad dressing, and contaminated water.	Stool culture, E. Coli 0157:H7 requires special media to grow. If E. coli 0157:H7 is suspected, specific testing must be requested. Shiga toxin testing may be done using commercial kits; positive isolates should be forwarded to public health laboratories for confirmation and serotyping.	Supportive care, monitor renal function, hemoglobin, and platelets closely. Studies indicate that antibiotics may be harmful. E. coli 0157:H7 infection is also associated with hemolytic uremic syndrome, which can cause lifelong complications.
Enterotoxigenic E. coli (ETEC)	1-3 days	Watery diarrhea, abdominal cramps, some vomiting.	3->7 days	Water or food contaminated with human feces.	Stool culture, ETEC requires special laboratory techniques for identification. If suspected, must request specific testing.	Supportive care. Antibiotics are rarely needed except in severe cases. Recommended antibiotics include TMP-SMX and quinolones.
Listeria monocytogenes	9-48 hrs for gastrointestinal symptoms, 2-6 weeks for invasive disease	Fever, muscle aches, and nausea or diarrhea. Pregnant women may have mild flu-like illness, and infection can lead to premature delivery or stillbirth. Elderly or immunocompromised patients may have bacteremia or meningitis.	Variable	Fresh soft cheeses, unpasteurized milk, inadequately pasteurized milk, ready-to-eat deli meats, hot dogs.	Blood or cerebrospinal fluid cultures. Asymptomatic fecal carriage occurs; therefore, stool culture usually not helpful. Antibody to listerolysin O may be helpful to identify outbreak retrospectively.	Supportive care and antibiotics; Intravenous ampicillin, penicillin, or TMP-SMX are recommended for invasive disease.
	At birth and infancy	Infants infected from mother at risk for sepsis or meningitis.				

(*Continued*) Foodborne Illnesses (Bacterial)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Salmonella ssp.	1-3 days	Diarrhea, fever, abdominal cramps, vomiting, S. typhi and S. paratyphi produce typhoid with insidious onset characterized by fever, headache, constipation, malaise, chills, and myalgia; diarrhea is uncommon, and vomiting is usually not severe.	4-7 days	Contaminated eggs, poultry, unpasteurized milk or juice, cheese, contaminated raw fruits and vegetables (alfalfa sprouts, meolns). S. typhi epidemics are often related to fecal contamination of water supplies or street-vended foods.	Routine stool cultures.	Supportive care. Other than for S. typhi, antibiotics are not indicated unless there is extra-intestinal spread, or the risk of extra-intestinal spread, of the infection. Consider ampicillin, gentamicin,TMP-SMX, or quinolones if indicated. A vaccine exists for S. typhi.
Shigella ssp.	24-48 hrs	Abdominal cramps, fever, and diarrhea. Stools may contain blood and mucus.	4-7 days	Food or water contaminated with fecal material. Usually person-to-person spread, fecal-oral transmission. Ready-to-eat foods touched by infected food workers, raw vegetables, egg salads.	Routine stool cultures.	Supportive care. TMP/SMX recommended in the US if organism is susceptible; nalidixic acid or other quinolones may be indicated if organism is resistant, especially in develop ing countries.
Staphylococcus aureus (preformed enterotoxin)	1-6 hrs	Sudden onset of severe nausea and vomiting. Abdominal cramps. Diarrhea and fever may be present.	24-48 hrs	Unrefrigerated or improperly refrigerated meats, potato and egg salads, cream pastries.	Normally a clinical diagnosis. Stool, vomitus, and food can be tested for toxin and cultured if indicated.	Supportive care
Vibrio cholerae (toxin)	24-72 hrs	Profuse watery diarrhea and vomiting, which can lead to severe dehydration and death within hours.	3-7 days. Causes life-threatening dehydration.	Contaminated water, fish, shellfish, street-vended food.	Stool culture; Vibrio cholerae requires special media to grow. If V. cholerae is suspected, must request specific testing.	Supportive care with aggressive oral and intravenous rehydration. In cases of concerned cholera, tetracycline or doxycycline is recommended for adults and TMP-SMX for children (<8 years)

(*Continued*) Foodborne Illnesses (Bacterial)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Vibrio para-haemolyticus	2-48 hrs	Watery diarrhea, abdominal cramps, nausea, vomiting	2-5 days	Undercooked or raw seafood, such as fish, shellfish.	Stool cultures. Vibrio para-haemolyticus requiers special media to grow. If V. para-hemolyticus is suspected, must request specific testing.	Supportive care. Antibiotics are recommended in severe cases: tetracycline, doxy-cycline, genta-micin, and cefotaxime.
Vibrio vulnificus	1-7 days	Vomiting, diarrhea, abdominal pain, bacte-remia, and wound infections. More common in the immunocompro-mised, or in patients with chronic liver disease (presenting with bullous skin lesions).	2-8 days; can be fatal in patients with liver disease and the immuno-compro-mised	Undercooked or raw shellfish, especially oysters; other contami-nated seafood, and open wounds exposed to sea water.	Stool, wound, or blood cultures. Vibrio vulnificus requires special media to grow. If V. vulnificus is suspected, must request specific testing.	Supportive care and antibiotics; tetracycline, doxycycline, and ceftazidime are recommended.
Yersinia enterocolytica and Y. pseudo-tuberculosis	24-48 hrs	Appendicitis-like symptoms (diarrhea and vomiting, fever, and abdominal pain) occur primarily in older children and young adults. May have a scarlitiniform rash with Y. pseudo-tuberculosis.	1-3 weeks	Undercooked pork, unpasteurized milk, contaminated water. Infection has occurred in infants whose care-givers handled chitterlings, tofu.	Stool, vomitus or blood culture. Yersinia requires special media to grow. If sus-pected, must request specific testing. Serology is available in research and reference laboratories.	Supportive care, usually self-limiting. If septicemia or other invasive disease occurs, antibiotic therapy with gentamicin or cefotaxime (doxycycline and ciprofloxacin also effective).

Foodborne Illnesses (Non-Infectious)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Antimony	5 min-8 hrs usually < 1 hr	Vomiting, metallic taste.	Usually self-limited	Metallic container.	Identification of metal in beverage or food.	Supportive care.
Arsenic	Few hrs	Vomiting, colic, diarrhea	Several days	Contaminated food.	Urine. May cause eosinophilia.	Gastric lavage, BAL (dimercaprol).
Cadmium	5 min-8 hrs usually < 1 hr	Nausea, vomiting, myalgia, increase in salivation, stomach pain.	Usually self-limited	Seafood, oysters, clams, lobster, grains, peanuts.	Identification of metal in food,	Supportive care.
Ciguatera fish poisoning (ciguatera toxin).	2- 6 hrs	GI; abdominal pain, nausea, vomiting, diarrhea	Days to weeks to months	A variety of large reef fish. Grouper, red snapper, amberjack, and barracuda (most common).	Radioassay for toxin in fish or a consistent history.	Supportive care. IV mannitol. Children more vulnerable.
	3 hrs	Neurologic: paresthesias, reversal of hot or cold, pain, weakness.				
	2-5 days	Cardiovascular: brady-cardia, hypotension, increase in T wave abnormalities.				
Copper	5 min-8 hrs usually < 1 hr	Nausea, vomiting, blue or green vomitus.	Usually self-limited	Metallic container.	Identification of metal in beverage or food.	Supportive care.
Mercury	1 week or longer	Numbness, weakness of legs, spastic paralysis, impaired vision, blindness, coma. Pregnant women and the developing fetus are especially vulnerable.	May be protracted	Fish exposed to organic mercury, grains teated with mercury fungicides.	Analysis of blood, hair.	Supportive care.
Mushroom toxins, short-acting (muscinol, muscarine, psilocybin, coprius artemetaris, ibotenic acid)	< 2 hrs	Vomiting, diarrhea, confusion, visual dis-turbance, salivation, dia-phoresis, hallucinations, disulfiram-like reaction, confusion, visual disturbance.	Self-limited	Wild mushrooms (cooking may not destroy these toxins).	Typical syndrome and mushroom identified or demonstration of the toxin.	Supportive care.

(*Continued*) Foodborne Illnesses (Non-Infectious)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Mushroom toxin, long-acting (amanital)	4-8 hrs diarrhea; 24-48 hrs liver failure	Diarrhea, abdominal cramps, leading to hepatic and renal failure	Often fatal	Mushrooms	Typical syndrome and mushroom identified and/or demonstration of the toxin.	Supportive care; life-threatening, may need life support.
Nitrite poisoning	1-2 hrs	Nausea, vomiting, cyanosis, headache, dizziness, weakness, loss of conciousness, chocolate-brown colored blood.	Usually self-limited	Cured meats, any contaminated foods, spinach exposed to excessive nitrification.	Analysis of the food, blood.	Supportive care, methylene blue.
Pesticides (organophos-phates or carbamates)	Few min to few hrs	Nausea, vomiting, abdominal cramps, diarrhea, headache, nervousness, blurred vision, twitching, convulsions.	Usually self-limited	Any contaminated food.	Analysis of the food, blood.	Atropine.
Puffer fish (tetrodotoxin)	< 30 min	Paresthesias, vomiting, diarrhea, abdominal pain, ascending paralysis, respiratory failure.	Death usually in 4-6 hrs	Puffer fish.	Detection of tetrodotoxin in fish	Life-threatening, may need respiratory support.
Scombroid (histamine)	1 min- 3 hrs	Flushing, rash, burning sensation of skin, mouth and throat, dizziness, urticaria, paresthesias.	3-6 hrs	Fish: bluefin, tuna, skipjack, mackerel, marlin, and mahi mahi.	Demonstration of histamine in food or clinical diagnosis.	Supportive care, antihistamines.
Shellfish toxins (diarrheic, neurotoxic, amnesic)	Diarrheic shellfish poisoning (DSP) - 30 min to 2 hrs	Nausea, vomiting, diarrhea, and abdominal pain accompanied by chills, headache, and fever.	Hrs to 2-3 days	A variety of shellfish, primarily mussels, oysters, scallops, and shellfish from the Florida coast and the Gulf of Mexico.	Detection of the toxin in shellfish, high pressure liquid chroma-tography.	Supportive care, generally self-limiting. Elderly are especially sensitive to ASP.
	Neurotoxic shellfish poisoning (NSP) - few min to hrs	Tingling and numbness of lips, tongue, and throat, muscular aches, dizziness, reversal of the sensations of hot and cold, diarrhea, and vomiting.				

(*Continued*) Foodborne Illnesses (Non-Infectious)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
	Amnesiac shellfish poisoning (ASP) - 24-48 hrs	Vomiting, diarrhea, abdominal pain and neurological problems such as confusion, memory loss, disorien-tation, seizure, coma.				
Shellfish toxins (paralytic Shellfish poisoning)	30 min - 3 hrs	Diarrhea, nausea, vomiting leading to paresthesias of mouth, lips, weakness, dysphasia, dysphonia, respiratory paralysis.	Days	Scallops, mussels, clams, cockles.	Detection of toxin in food or water where fish are located; high pressure liquid chromatography.	Life-threatening, may need respiratory support.
Sodium fluoride	Few minutes to 2 hrs	Salty or soapy taste, numbness of mouth, vomiting, diarrhea, dilated pupils, spasms, pallor, shock, collapse.	Usually self-limited.	Dry foods (such as dry milk, flour, baking powder, cake mixes) contaminated with sodium fluoride-containing insecticides and rodenticides.	Testing of vomitus or gastric washings. Analysis of the food.	Supportive care.
Thallium	Few hrs	Nausea, vomiting, diarrhea, painful paresthesias, motor polyneuropathy, hair loss.	Several days.	Contaminated food.	Urine, hair.	Supportive care.
Tin	5 min - 8 hrs usually < 1 hr	Nausea, vomiting, diarrhea.	Usually self-limited	Metallic container.	Analysis of the food.	Supportive care.
Vomotoxin	Few min to 3 hrs	Nausea, headache, abdominal pain, vomiting	Usually self-limited	Grains, such as wheat, corn, barley.	Analysis of the food.	Supportive care.
Zinc	Few hrs	Stomach cramps, nausea, vomiting, diarrhea, myalgias.	Usually self-limited	Metallic container.	Analysis of the food, blood and feces, saliva or urine.	Supportive care.

Foodborne Illnesses (Parasitic)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Cryptosporidium parvum	7 days average (2-28 days)	Cramping, abdominal pain, watery diarrhea; fever and vomiting may be present and may be relapsing.	Days to weeks	Contaminated water supply, vegetables, fruits, unpasteurized milk.	Must be specifically requested May need to examine water or food.	Supportive care, self-limited. If severe consider paromomycin for 7 days.
Cyclospora cayetanensis	1-11 days	Fatigue, protracted diarrhea, often relapsing.	May be protracted (several weeks to several months)	Imported berries, contaminated water, lettuce	Request specific examination of the stool of Cyclospora. May need to examine water or food.	TMP/SMX for 7 days.
Entamoeba histolytica	2-3 days to 1-4 weeks	Bloody diarrhea, frequent bowel movements (looks like Shigella), lower abdominal pain.	Months	Fecal-oral; may contaminate water and food.	Examination of stool for cysts and parasites-at least 3 samples. Serology for long-term infections.	Metronidazole and iodoquinol.
Giardia lamblia	1-4 weeks	Acute or chronic diarrhea, flatulence, bloating.	Weeks	Drinking water, other food sources.	Examination of stool for ova and parasites-at least 3 samples.	Metronidazole.
Toxoplasma gondii	6-10 days	Generally asymptomatic, 20% may develop cervical lymphadenopathy and/or a flu-like illness. In immunocompromised patients: central nervous system (CNS) disease, myocarditis, or pneumonitis is ofter seen.	Months	Accidental ingestion of contaminated substances (e.g. putting hands in mouth after gardening or cleaning cat litter box); raw or partly cooked pork, lamb, or venison.	Isolation of parasites from blood or other body fluids; observation of parasites in patient specimens, such as bronchoalveolar lavage material or lymph node biopsy. Detection of organisms is rare, but serology can be a useful adjunct in diagnosing toxoplasmosis. Toxoplasma-specific IgM antibodies should be confirmed by a reference laboratory. However, IgM antibodies may persist for 6-18 months and thus may not necessarily indicate recent infection For congenital infection: isolation of T. gondii from placenta, umbilical cord, or infant blood. PCR of white blood cells, CSF, or amniotic fluid (reference laboratory). IgM and IgA serology (reference laboratory).	Asymptomatic healthy, but infected, persons do not require treatment. Spiramycin or pyrimethamine plus sulfadiazine may be used for immunocompromised persons or pregnant women, in specific cases.

(*Continued*) Foodborne Illnesses (Parasitic)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Toxoplasma gondii (congenital infection)	In infants at birth	Treatment of the mother may reduce severity and/ or incidence of congenital infection. Most infected infants have few symptoms at birth. Later, they will generally develop signs of congenital toxo-plasmosis (mental retardation, severely impaired eyesight, cerebral palsy, seizures) unless the infection is treated.		Passed from mother who acquired acute infection during pregnancy to child.		
Trichinella spiralis	1-2 days to 2-8 weeks	Nausea, vomiting, diarrhea, abdominal discomfort followed by fever, myalgias periorbital edema.	Months	Raw or undercooked contaminated meat, usually pork or wild game meat, e.g. bear or moose.	Positive serology or demonstration of larvae via muscle biopsy. Increase in eosinophils.	Supportive care + mebendazole.

Foodborne Illnesses (Viral)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Hepatitis A	30 days average (15-50 days)	Diarrhea; dark urine; jaundice; and flu-like symptoms, (i.e., fever headache, nausea, and abdominal pain	Variable, 2 weeks - 3 months	Shellfish harvested from contaminated waters, raw produce, uncooked foods and cooked foods that are not reheated after contact with infected food handler.	Increase ALT, bilirubin, Positive IgM and anti-hepatitis A antibodies.	Supportive care. Prevention with immunization.
Norwalk-like viruses	24-48 hrs	Nausea, vomiting, watery, large-volume diarrhea; fever rare	24-60 hrs	Poorly cooked shellfish; ready-to-eat foods touched by infected workers; salads, sandwiches, ice, cookies, fruit.	Clinical diagnosis, negative bacterial cultures, > fourfold increase in antibody titers of Norwalk antibodies, acute and convalescent, special viral assays in reference lab. Stool is negative for WBC's.	Supportive care. Bismuth sulfate.
Rotavirus	1-3 days	Vomiting, watery diarrhea, low-grade fever. Temporary lactose intolerance may occur. Infants and children, elderly, and immunocom-promised are especially vulnerable.	4-8 days	Fecally contaminated foods. Ready-to-eat foods touched by infected food workers (salads, fruits).	Identification of virus in stool via immunoassay.	Supportive care. Severe diarrhea may require fluid and electrolyte replacement.
Other viral agents (astro-viruses, calci-viruses, adenoviruses, parvoviruses)	10-70 hrs	Nausea, vomiting, diarrhea, malaise, abdominal pain, headache, fever.	2-9 days	Fecally contaminated foods. Ready-to-eat foods touched by infected food workers. Some shellfish.	Identification of the virus in early acute stool samples. Serology.	Supportive care, usually mild, self-limiting.